



**MISSOURI**  
DEPARTMENT OF  
NATURAL RESOURCES

## **Regulatory Impact Report**

### **10 CSR 20-7.031 Water Quality Standards**

Pursuant to Section 640.015, RSMo, all rulemakings that prescribe environmental conditions or standards promulgated by the Department of Natural Resources pursuant to authorities granted in Chapters 640, 260, 278, 319, 444, 643, or 644 shall be based on a regulatory impact report. This requirement does not apply to rules where the Department Director determines that immediate action is necessary to protect human health, public welfare, or the environment; or to rules of applicable federal agencies adopted by the Department without variance.

Upon completion of the comment period, official responses will be developed and made available on the agency web page prior to filing an Order of Rulemaking with the Secretary of State. Contact information is at the end of this regulatory impact report.

#### **1. A report on the peer-reviewed scientific data used to commence the rulemaking process.**

##### **a. Specific Criteria for Lakes**

The proposed revisions amend 10 CSR 20-7.031 Water Quality Standards to include specific criteria for two cyanotoxins, microcystins and cylindrospermopsin. To assist states with developing recreational use protection in their water quality standards, the United States Environmental Protection Agency (EPA) developed *Recommended Human Health Recreational Ambient Water Quality Criteria or Swimming Advisories for Microcystins and Cylindrospermopsin* (see Appendix I). This document and additional documentation referenced in Appendix I were reviewed and considered in drafting the general criteria language for protection of recreational uses at 10 CSR 20-7.301(5)(D). Additionally, the Water Protection Program researched available cyanotoxin data and monitoring records.

##### **b. Water Quality Standards Variances**

This proposed revision includes the removal of the Bolivar variance. No additional peer-reviewed scientific data was necessary to remove the variance listing.

#### **2. A description of persons who will most likely be affected by the proposed rule, including persons that will bear the costs of the proposed rule and persons that will benefit from the proposed rule.**

##### **a. Specific Criteria for Lakes**

The proposed amendment to the rule includes the adoption of EPA's recommended human health recreational use criteria. The proposed amendment develops quantitative specific criteria for cyanotoxins, specifically 8 micrograms per liter ( $\mu\text{g}/\text{L}$ ) for microcystins and 15  $\mu\text{g}/\text{L}$  for cylindrospermopsin. The criteria would be applicable to all lakes and reservoirs that are Waters of the State, that are greater than or equal to 10 acres, and are designated for recreational use,

providing protection of whole body recreation (i.e., swimming). This proposed amendment to the rule does not impact smaller, independently owned lakes or reservoirs.

Excess nutrients can cause eutrophication resulting in excess algae or plant growth and the reduction of oxygen. This eutrophication process can result in impacts to aquatic life and potentially contribute to harmful algal blooms (HABs), which may generate cyanotoxins. Additionally, 10 CSR 20-7.031(5)(N) establishes lake nutrient criteria, which evaluate total phosphorus, total nitrogen and chlorophyll-a, and considers eutrophication factors and cyanobacteria counts. Other than the newly included lakes in the Big River Floodplain ecoregion, the lakes covered by this proposed rule amendment are already subject to the lake nutrient criteria. As such, HABs could potentially be a consideration in a lake nutrient impairment determination.

The proposed amendment is not intended to pose new routine sampling requirements on permittees, but rather, sampling will occur in response to the report of suspected HABs in lakes greater than or equal to 10 acres, most of which are subject to the lake Numeric Nutrient Criteria (NNC) [10 CSR 20-7.031(5)(N)]. Assessment of lake nutrient criteria considers HABs through Eutrophication Factor C, cyanobacteria cell count. The Listing Methodology Document (LMD) references cyanotoxins as a surrogate for cyanobacteria cell counts. The only lakes potentially impacted by this rule that are not already subject to lake NNC are located in the Big River Floodplain Ecoregion. There is only one wastewater treatment facility that directly discharges to a lake or reservoir in this ecoregion, located on Big Lake at the MDNR, Big Lake State Park (Figure 1). The facility consists of a two-cell storage lagoon, the contents of which are pumped and hauled to another wastewater treatment facility to prevent discharge from Outfall #001. The Department is considering alternative treatment options for this facility, including a subsurface system, which will result in the elimination of Outfall #001. Outfall #002 consists solely of the State Park's swimming pool discharge.



Figure 1: NPDES outfalls on Big Lake at MDNR, Big Lake State Park (MO0129259)

The Department will bear a majority of the costs associated with the proposed amendment to the rule, as the proposed amendment is not intended to pose new routine sampling requirements on permittees. Currently, routine sampling is conducted by the Lakes of Missouri Volunteer Program (LMVP) and the Statewide Lake Assessment Program (SLAP) through a cooperative agreement with the University of Missouri. Data from these sampling events are used by the Department during the biennial assessment of Missouri waters. The Department anticipates that lake managers such as Missouri State Parks (MSP), U.S. Army Corps of Engineers (USACE), and marina operators may wish to participate in routine sampling; however, it is not a requirement associated with the potential proposed criteria. The Department does not anticipate routine monitoring will be required in permits at regulated facilities.

Persons that may benefit from the proposed rule include those that use waters of the state for recreational purposes. Nutrient criteria have been established for lakes, with specific total phosphorus effluent limitations for Table Rock Lake and Lake Taneycomo. This improvement has benefitted all Missourians who use our waters for recreational purposes such as swimming, duck hunting, kayaking, and fishing. With these ancillary or incidental improvements to our waters, it will also benefit Missourians using water for irrigation, livestock watering, groundwater (drinking) wells, and all who use groundwater or surface water as the source of their drinking water. In short, improving water quality benefits everyone.

b. Water Quality Standard Variance

The proposed revisions are not anticipated to affect any individuals, aside from the Department.

**3. A description of the environmental and economic costs and benefits of the proposed rule.**

a. Specific Criteria for Lakes

Economic costs are calculated here using information collected from Missouri Department of Natural Resources Environmental Services Program (ESP) and the Water Protection Program's Monitoring and Assessment Unit (MAU). No significant economic or environmental costs are associated with the proposed revisions. The proposed revisions will allow the Department to decrease the number of costly issues associated with remediating water bodies that have been negatively impacted by high levels of cyanotoxins. Additionally, the proposed amendment to the rule can be expected to decrease the economic cost that can be brought upon individuals who suffer health issues from recreating in a water body with high levels of toxins.

Economic benefits are associated with continued beneficial designated uses of the waters of the state. Excess nutrients may lead to excess algal growth, reduction or mortality of aquatic life, and may even contribute to HABs. Excess algae may inhibit the use of the water for irrigation and livestock watering. Excess algae and the impacts to aquatic life may also result in reduction of recreational uses, like fishing, swimming, floating, wading, and boating. HABs, or even other algal blooms that simply have not been properly assessed, can result in closure of swimming areas and other recreational activities on lakes. Closure of lakes due to HABs results in a loss of revenue for the community when boating, fishing, and swimming are not allowed or recommended. These activities support fueling, dining and shopping on and around the lake areas.

Failure to control excess nutrients can cause eutrophication, resulting in excess algae or plant growth and a reduction in oxygen content. These events can result in impacts to aquatic life, including but not limited to fish and shellfish, as well as wildlife. The impacts to aquatic life can be a reduction in the population or reproduction in the fish community and may even result in mortality events. Increased algae in waters may block or clog irrigation systems and may be undesirable or unusable for wildlife and livestock watering. Recreational uses, such as swimming, fishing, wading, and boating may decline significantly if the water contains high levels of algae, declining fish populations, aquatic life mortalities, and detritus. HABs can be toxic to fish, shellfish, wildlife, livestock, pets, and even humans.

Other economic beneficiaries include businesses that are reliant on tourism-related lake recreation, such as restaurants, hotels, and marinas, as well as gas stations both near to and on the way to or from resort areas. Several studies demonstrated relationships between lake water clarity and levels of tourist recreation (Bouwes and Schneider, 1979; Ribaudo and Epp, 1984; Smith et al., 1986; Wilson and Carpenter, 1999). Protected and enhanced water clarity will maintain and improve opportunities for whole body contact recreation. Conversely, numerous studies have demonstrated that the reduced water clarity have resulted in a wide range of losses of home values (U.S. EPA, 2015). Krysel et al. (2003) analyzed more than 1,200 lakeshore property sales in northern Minnesota that occurred between 1996 and 2001. Water clarity was a significant explanatory variable for lakeshore property prices. A loss of 1 m in Secchi depth could result in losses of up to \$80,000 sales value in an individual lot. Kashian and Kasper (2010) found a decrease of \$128 to \$402 in the value per shoreline foot in Wisconsin lakes that had high algae blooms, when compared with nearby lakes that did not have this problem.

b. Water Quality Standards Variances

No significant economic or environmental costs or benefits are expected from the proposed removal of the Bolivar variance.

**4. The probable costs to the agency and to any other agency of the implementation and enforcement of the proposed rule and any anticipated effect on state revenue.**

a. Specific Criteria for Lakes

Additional costs to the Department are expected to be minimal, as sampling for algal toxins will be performed on a response-basis by the Department's MAU. The Department anticipates that lake managers such as Missouri State Parks, U.S. Army Corps of Engineers, and marina operators may wish to participate in routine sampling; however, it is not a requirement associated with the potential proposed criteria. The Department does not anticipate routine monitoring will be required in permits at regulated facilities.

The Department plans to conduct response-based sampling for cyanotoxins with the Monitoring and Assessment Unit's Harmful Algal Bloom (HAB) algal toxin sampling and generate a probable cost of approximately \$436.36 per sampling event. This estimate is based on a staffing cost of approximately \$185.36, for 8 hours of an Environmental Program Analyst work. Additionally, each sampling event requires a glass sample container for each toxin, which costs approximately \$1.00 each. Laboratory sample analysis for cyanotoxins may be conducted using a

dipstick test or other analysis kits. The cost of a dipstick sample may range from \$25 to \$45 per test, with an estimated cost of approximately \$225 to \$245 per kit. Using these values, the annual cost to the Department can be estimated by using the following:

- $(\$185.36/\text{staff time}) + (\$1.00/\text{1 glass sample container}) + (\$25.00/\text{1 dipstick test}) + (\$225.00/\text{test kit}) = \$436.36/\text{sample event}$
- We anticipate 31 response activities per year, based on 2021 reported HAB events,  $(\text{estimated 31 response events} + 6 \text{ follow up sample events}) \times (\$436.36/\text{sample event}) = \$16,145.32$

Please note that of the 31 reported HABs in 2021, the Department or the Lake Manager conducted response sampling at 20 of the locations. Of the remaining 11 sites, 4 were in private lakes not under the purview of the Department or this proposed rule and 2 did not contain any algae. This means that should this rule amendment become effective as proposed, only 6 new sampling events and perhaps 6 follow-up sampling events may occur. The cost estimate listed above is a conservative estimate based on reported HABs and anticipated sampling necessary under this proposed rule amendment. However, the Department already conducts this sampling and believes the cost estimates are reasonable since more than half of the sampling and associated cost is already occurring before rule amendment promulgation.

The Department does not anticipate routine monitoring will be required in permits at regulated facilities; however, lake managers such as MSP, USACE, and marina operators may wish to participate in routine sampling. Voluntary routine sampling is anticipated to generate a probable cost of approximately \$274.17 per sampling event. This estimate is based on a staffing cost of approximately \$23.17, for 1 hour of an Environmental Program Analyst work. The Department assumes lake managers area already on-site, so the cost of mobilization is reduced. MSP currently samples for *Escherichia coli* (*E. coli*) on a weekly basis throughout the recreational tourist season, which occurs April 1 to October 31. Samples are delivered using the Missouri Department of Health and Senior Services courier service, which generates a probable cost of approximately \$6.50 per package. Each sample event requires a glass sample container, which costs approximately \$1.00 each. With the proposed frequency and duration requirements, sampling would occur at least four times a year, should MSP or other interested agencies decide to participate in routine sampling. Furthermore, laboratory sample analysis may be conducted using a dipstick test or other analysis kits. The probable cost of a dipstick sampling may range from \$25 to \$45 per test, with an overall estimated cost of approximately \$225 to \$245 per kit. The potential annual cost to lake managers and interested agencies that wish to voluntarily sample on a routine basis can be estimated by using the following:

- $(\$23.17/\text{staff time}) + (\$1.00/\text{1 glass sample containers}) + (\$25.00/\text{1 dipstick test}) + (\$225.00/\text{test kit}) = \$274.17/\text{sample event}$
- $(\$274.17/\text{ sample event}) + (\$6.50/\text{sample shipment with local Health Department}) + (\$46.34/\text{two hours Environmental Program Analyst or equivalent staff time}) = \$327.01/\text{sample event}$
- $(18 \text{ State Park beaches}) \times (4 \text{ samples/year}) \times (\$327.014/\text{sample event}) = \$23,544.72/\text{year}$

There is no anticipated effect on state revenue, as any extra costs associated with the proposed rule are generally expected to be covered by existing fee and grant funds.

The response to question 3 above includes studies on the impact of increase water quality for a community. A reduction in cyanotoxins should similarly enhance our waters of the state and, therefore, will benefit recreational uses in Missouri. While the economic impact would likely not be comparable to tourism dollars, increase recreational use of our waters may have minimal, incidental, indirect positive impacts on state revenue.

b. Water Quality Standards Variances

The proposed removal of the Bolivar variance should not generate any probable costs to the Department or to any other agency. There is no substantial effect anticipated on state revenue.

**5. A comparison of the probable costs and benefits of the proposed rule to the probable costs and benefits of inaction, which includes both economic and environmental costs and benefits.**

a. Specific Criteria for Lakes

The probable costs and benefits of the proposed rule are listed above in response to Question 4. The Department anticipates the probable economic costs associated with inaction have the potential to include more frequent remediation costs, along with increased medical costs to those experiencing adverse health effects from a HAB. The cost of inaction would be difficult to quantify as the effects of declining water quality are often long-term and changes are subtle, but some of the tourism related potential benefits and impacts are outlined in response to Question 3.

The Department anticipates the probable environmental costs associated with inaction would include decreased water quality and potential increase to adverse health effects in humans. Economic benefits of inaction are minimal.

Regulation of cyanotoxin levels in waters of the state is vital in maintaining these uses of our waters. As also stated above in question 3, reduction in cyanotoxins should enhance our waters of the state and, therefore, benefit recreational uses in Missouri. Inaction could result in short-term and long-term impacts to the sustainability of recreational use waters applicable to the proposed amendment.

b. Water Quality Standards Variances

No environmental and economic costs or benefits are anticipated as a result of the rule revision. Inaction would defer the removal of the Bolivar variance until a later date, potentially causing confusion as to which variances are active.

**6. A determination of whether there are less costly or less intrusive methods for achieving the proposed rule.**

a. Specific Criteria for Lakes

This rulemaking process initially began with a petition received from Missouri Coalition for the Environment, giving the Department two reasonable options: amend the current rule to adopt the

criteria, or continue without change to the rule. The proposed revisions to the rule are not anticipated to generate excessive costs.

b. Water Quality Standards Variances

There were no alternative approaches in achieving the proposed removal of the Bolivar variance.

**7. A description of any alternative method for achieving the purpose of the proposed rule that were seriously considered by the Department and the reasons why they were rejected in favor of the proposed rule.**

a. Specific Criteria for Lakes

As mentioned in number 6 above, the proposed amendment to the rule was submitted by Missouri Coalition for the Environment. Research by the Department indicates that some states and authorized tribes have established numeric criteria for microcystins and cylindrospermopsin. The proposed revisions will aid in improving the effectiveness of the rule in protecting waters of the state.

The Department considered two alternative regulatory approaches with regards to the applicability of the proposed regulation. First, the Department considered applying the proposed criteria to all lakes and reservoirs that are considered Waters of the State (WOTS) as defined by RSMo. 644.016(24). In 2014, the Department extended its protection of the fishable/swimmable use designation by classifying more than 90,000 stream miles and 70,000 lake acres in the Missouri Use Designation Dataset (MUDD). This was conducted by an unsupervised automated Geographic Information System (GIS) process, which means some features were classified as WOTS, when in actuality, they are wastewater treatment systems or man-made bodies of water used to hold or slow stormwater. The Department plans to review and correct the MUDD in the subsequent triennial review. After such time, the Department may consider expanding the applicability of the proposed criteria to lakes and reservoirs less than 10 acres.

Second, the Department considered applying the proposed criteria to all waterbodies with numeric nutrient criteria (NNC), which is an aquatic life criteria applicable to lakes and reservoirs greater than or equal to 10 acres in the Ozark Highland, Ozark Boarder, and Plains ecoregions. The NNC includes eutrophication factors for determining an impairment of a lake or reservoir, one of which is cyanobacteria counts. The Big River Floodplain ecoregion was excluded from NNC due to the complex topography in the region, which renders it difficult to identify the most sensitive use in a waterbody. Including the Big River Floodplain ecoregion in the proposed rule will provide protection to the recreational use of lakes greater than or equal to 10 acres throughout the entire state.

b. Water Quality Standards Variances

There were no alternative methods for the Department to consider.

## **8. An analysis of both short-term and long-term consequences of the proposed rule.**

The Department must consider the inherent short- and long-term consequences during rulemaking through the regulatory impact report process. Consequences of the short and long term could be fiscal, environmental, legislative, or any other adverse condition that may arise as a result of implementation of the proposed rule. To the extent that the Department can estimate short- and long-term consequences for the proposed rule, those are listed in the following section:

### **a. Specific Criteria for Lakes**

The short-term and long-term consequences of this proposed rule are the same: the protection of human health recreation without imposing unnecessary costs to the regulated community. Currently, when an algal bloom occurs in a lake or reservoir that is WOTS, the Department responds with sampling to determine if the bloom is considered a HAB. An additional long-term consequence of this proposed rule is the ability to collect additional data to help the Department determine a cause or common contributing factor for a HAB. By having a criteria for cyanotoxins, the Department will have the ability to list a waterbody as impaired, specifically for human health recreation, and implement process to address cyanotoxins in the waterbody. Ultimately this will lead to decreased potential for illnesses associated with HABs occurring in humans, specifically children, that recreate in WOTS; decreased potential for deaths in animals associated with HABs; and decreased remediation efforts required as a result of HABs.

### **b. Water Quality Standards Variances**

The proposed rule to remove an existing variance is not anticipated to have any short-term or long-term consequences.

## **9. An explanation of the risks to human health, public welfare or the environment addressed by the proposed rule.**

### **a. Specific Criteria for Lakes**

Missourians may be exposed to cyanotoxins in multiple different ways as a result of recreating on Missouri waters with excess nutrients, including via dermal exposure, incidental ingestion and inhalation while recreating. Dermal exposure during recreational activities can cause skin rashes, eye and ear irritation. Incidental ingestion and inhalation during recreation is frequent when the waterbody is being used for whole body contact, with children ingesting more water during recreation on average. When cyanotoxins are ingested or inhaled, these toxins may lead to illnesses such as gastrointestinal illnesses, liver and kidney damage, fever and more. This proposed amendment to adopt EPA's recommended criteria for cyanotoxins effects lakes and reservoirs greater than or equal to 10 acres, designated for recreational use, and provide protection for whole body recreation. Applying this rule to lakes used for recreation will help limit exposure to cyanotoxins, protect the health of all Missourians, and protect the existing uses of Missouri waterbodies. Additional information on risk assessment can be obtained by reviewing the administrative record created during EPA's development of their technical guidelines and guidance for these criteria.

- <https://www.epa.gov/sites/default/files/2019-05/documents/hh-rec-criteria-habs-document-2019.pdf>

b. Water Quality Standards Variances

The proposed removal of an existing variance is not anticipated to include risks to human health, public welfare, or the environment.

**10. The identification of the sources of scientific information used in evaluating the risk and a summary of such information.**

a. Specific Criteria for Lakes

In review of the federal recommendation for microcystins and cylindrospermopsin criteria, the Department reviewed research compiled in Missouri Coalition for the Environment's petition, as well as studies presented by the EPA in support of the recommendation. Sources used for the risk assessment in the development of criteria were conducted by the EPA and are included in the recommendation document below. Because the Department is proposing to adopt federal Section 304(a) water quality criteria without modification, further information on risk assessment may be obtained by reviewing the administrative record created during EPA's development of their guidelines and guidance for these criteria. In these cases, the Department defers to the science used in the national studies for evaluating risks to human health, public welfare and the environment.

- <https://www.epa.gov/sites/default/files/2019-05/documents/hh-rec-criteria-habs-document-2019.pdf>

For all other proposed revisions, risks to human health, public welfare, or the environment will be minimal or non-existent (See Section 9); therefore, no sources of scientific information needed to be identified to evaluate risk.

b. Water Quality Standards Variances

Risks to human health, public welfare, or the environment are anticipated to be non-existent; therefore, no uncertainties or assumptions needed to be made to evaluate risk.

**11. A description and impact statement of any uncertainties and assumptions made in conducting the analysis on the resulting risk estimate.**

a. Specific Criteria for Lakes

In review of the federal recommendation for microcystins and cylindrospermopsin criteria, the Department reviewed research compiled in Missouri Coalition for the Environment's petition, as well as studies presented by the EPA in support of the recommendation. Sources used for the risk assessment in the development of criteria were conducted by the EPA and are included in the recommendation document below. Because the Department is adopting federal standards for these revisions, obtain further information on uncertainties and assumptions made during the risk

assessment by reviewing the administrative record created during EPA's development of technical guidelines and guidance for these cyanotoxins:

- <https://www.epa.gov/sites/default/files/2019-05/documents/hh-rec-criteria-habs-document-2019.pdf>

b. Water Quality Standards Variances

Risks to human health, public welfare, or the environment are anticipated to be non-existent; therefore, no uncertainties or assumptions needed to be made to evaluate risk.

**12. A description of any significant countervailing risks that may be caused by the proposed rule.**

Other than the economic impacts listed above, to the best of our knowledge, the Department expects no significant countervailing risks to occur that are associated with the proposed rule revisions.

**13. The identification of at least one, if any, alternative regulatory approaches that will produce comparable human health, public welfare or environmental outcomes.**

As described above in number 7, the Department considered two additional approaches with regards to the applicability of the proposed rule. The Department initially considered applying the proposed criteria to all lakes and reservoirs that are considered WOTS; however, due to the unsupervised automated GIS process used to expand Missouri Use Designation Dataset (MUDD), a number of waterbodies were erroneously classified as lakes but are actually wastewater treatment systems or man-made bodies of water used to hold or slow stormwater. The Department plans to review and correct the MUDD in the subsequent triennial review.

Additionally, the Department considered applying the proposed criteria to all waterbodies with numeric nutrient criteria (NNC), an aquatic life criteria applicable to lakes and reservoirs greater than or equal to 10 acres, excluding those waterbodies in the Big River Floodplain ecoregion. The NNC includes eutrophication factors for determining an impairment, one of which is cyanobacteria counts. Because of this, the Department elected to include the Big River Floodplain ecoregion in the proposed rule to ensure the protection of the recreational use.

**14. Provide information on how to provide comments on the Regulatory Impact Report during the 60-day period before the proposed rule is filed with the Secretary of State.**

Regulatory Impact Reports for current rule developments of the Water Protection Program may be found on the program's Rule Development web page: <https://dnr.mo.gov/water/what-were-doing/water-planning/quality-standards-impaired-waters-total-maximum-daily-loads/standards/review>

Comments can be provided on either the Regulatory Impact Report (RIR) or the draft rule text by sending them to the contact listed below or on the web site <https://dnr.mo.gov/laws-rules-regulations> during the RIR comment period. The comment period for this Regulatory Impact Report was September 23, 2022 through November 21, 2022.

Comments may also be submitted by email to: [wqs@dnr.mo.gov](mailto:wqs@dnr.mo.gov)

Comments may also be sent by mail to:

Missouri Department of Natural Resources  
Division of Environmental Quality  
Water Protection Program  
Attn: WQS Coordinator  
P.O. Box 176  
Jefferson City, Missouri 65102-0176

Copies of the comments made on either the Regulatory Impact Report or the draft rule text may be obtained by request from the contact listed above or by accessing the Rules In Development section on the web site <https://apps5.mo.gov/proposed-rules/rules.action#OPEN> for this particular rulemaking.

## Appendix I

*Blue Green Algae in Missouri: Cyanotoxins*, LAKES OF MISSOURI VOLUNTEER PROGRAM, <https://www.lmvp.org/bluegreen/cyanotoxins.html>.

Bryan W. Brooks et al., *Are harmful algal blooms becoming the greatest inland water quality threat to public health and aquatic ecosystems?*, 35 ENV'T TOXICOLOGY 6 (2016).

CDC, CS258158, *Cyanobacterial Blooms FAQs*.

*DNR reminds Missourians to be aware of potential harmful algae blooms in waterways this summer*, Mo DNR (June 10, 2020), <https://dnr.mo.gov/communications/news/dnr-reminds-missourians-be-aware-potential-harmful-algae-blooms-waterways-summer>.

Ellen P. Preece et al., *A Review of microcystin detections in estuarine and marine waters: environmental implications and human health risk*, 61 HARMFUL ALGAE 31 (2017).

EPA, 820R15100, Drinking Water Health Advisory for the Cyanobacterial Microcystin Toxins (June 2015).

EPA, 820-S-13-001, *Impacts of Climate Change on the Occurrence of Harmful Algal Blooms*, at 3 (May 2013).

EPA, 822-F-19-001, Fact Sheet: Recommended Human Health Recreational Ambient Water Quality Criteria or Swimming Advisories for Microcystins and Cylindrospermopsin (May 2019).

EPA, 822-R-19-001, Recommended Human Health Recreational Ambient Water Quality Criteria or Swimming Advisories for Microcystins and Cylindrospermopsin (May 2019).

Fang Zhang et al., *Cyanobacteria blooms and non-alcoholic liver disease: evidence from a county level ecological study in the United States*, 14 ENV'T HEALTH 41 (2015).

Ingrid Chorus and Jamie Bartram, *Chapter 2. Cyanobacteria in the Environment*, in *Toxic Cyanobacteria in Water: A guide to their public health consequences, monitoring and management* (1999).

Lorraine C. Backer, *Canine cyanotoxin poisonings in the United States (1920s-2012): Review of Suspected and Confirmed Cases from Three Data Sources*, 5 TOXINS 1597 (2013).

Missouri Department of Natural Resources, Methodology for the Development of the 2020 Section 303(d) List in Missouri, (July 22, 2019).

Missouri, OUTDOOR INDUS. ASS'N, [https://outdoorindustry.org/wp-content/uploads/2017/07/OIA\\_RecEcoState\\_MO.pdf](https://outdoorindustry.org/wp-content/uploads/2017/07/OIA_RecEcoState_MO.pdf).

Roslyn Wood, *Acute animal and human poisonings from cyanotoxin exposure-a review of the literature*, 91 ENV'T INT'L 276, 279 (2016).

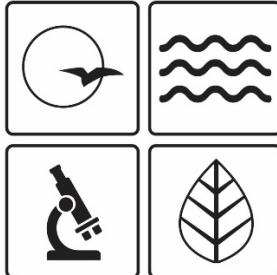
Steven C. Chapra et al., *Climate Change Impacts on Harmful Algal Blooms in U.S. Freshwaters: A Screening-Level Assessment*, 51 ENV'T SCI. & TECH. 8933 (2017).

U.S. Geological Survey, Open-File Report 2016-1174, Cyanobacterial Harmful Algal Blooms and Science Capabilities: U.S. Geological Survey Science Capabilities (Dec. 2017).

Walter K. Dodds et al., *Eutrophication of U.S. Freshwaters: Analysis of Potential Economic Damages*, 43 ENV'T SCI. AND TECH. 12 (2009).

Wayne W. Carmichael et al., *Human fatalities from cyanobacteria: chemical and biological evidence for cyanotoxins*, 109 ENV'T HEALTH PERSPS. 663 (2001).

# MISSOURI



# NATURAL RESOURCES

## Regulatory Impact Report for 10 CSR 20-7.031, *Water Quality Standards* SUMMARY AND RESPONSE TO COMMENTS

### Public Notice

September 29, 2022 through November 21, 2022

Missouri Department of Natural Resources  
Water Protection Program  
P.O. Box 176  
Jefferson City, MO 65102-0176  
800-361-4827 / 573-751-1300

## **INTRODUCTION**

The Missouri Department of Natural Resources has published a Regulatory Impact Report (“report” or “RIR”) on proposed revisions to Missouri rule 10 CSR 20-7.031, *Water Quality Standards*. The report is required at the beginning of the rulemaking process for rules prescribing environmental standards or conditions. The report documents the environmental and economic costs and benefits associated with all proposed changes.

The 60-day public comment period for the report began on September 29, 2022, and concluded on November 21, 2022.

This document summarizes and paraphrases the comments received during the public comment period and provides the Department’s responses to those comments. All public comments received are available in their entirety online at [dnr.mo.gov/env/wpp/rules/wpp-rule-dev.htm](https://dnr.mo.gov/env/wpp/rules/wpp-rule-dev.htm).

The Department received comments from the following groups:

Brundage Environmental – on behalf of Missouri Corn Growers Association, Missouri Soybean Association, Missouri Farm Bureau, Missouri Agribusiness Association, Missouri Pork Association, and Missouri Cattlemen’s Association  
Missouri Coalition for the Environment

## **RESPONSE TO COMMENTS**

**(Public comments in bold)**

1. Comment: **Brundage Environmental submitted multiple comments contending the RIR did not discuss peer-reviewed data, or Missouri-specific data or concerns. The RIR also fails to mention that cyanotoxin levels are not strongly correlated to increased nutrient and chlorophyll-a levels. Additionally, Missouri should not be the third state to adopt a new EPA recommended criteria.**

1. Response: The Missouri Department of Natural Resources (Department) reviewed and considered EPA's *Recommended Human Health Recreational Ambient Water Quality Criteria or Swimming Advisories for Microcystins and Cylindrospermopsin* (2019 recommended criteria) which is based on the latest scientific knowledge and contains numerous peer-reviewed science, information, and studies to support the Department's recommended criteria for cyanotoxins. Additionally, the Department reviewed and considered all of the sources referenced in the petition request. Appendix 1 of the RIR contains peer reviewed scientific sources that were reviewed and considered by Department staff in the analysis of cyanotoxin criteria.

The proposed rule is for a human health recreational criteria. As human health recreational criteria is not endemic of specific regional waterbodies, the Department did not rely solely on Missouri data when determining the applicable criteria; however, Missouri-specific data was reviewed and considered when determining to adopt the proposed criteria. The peer-reviewed information from the EPA's 2019 recommended criteria also discusses examples of human health effects during or after exposure to cyanotoxin exposure.

Existing data collected by or for the Department do not show a strong correlation between cyanotoxins and chlorophyll-a levels; however, the Department believes this supports its determination to adopt this criteria. Numeric nutrient criteria (NNC), adopted in 2019, is an aquatic life criteria applicable to lakes greater than 10 acres that are waters of the state (WOTS), outside of the Big River Floodplain ecoregion and includes criteria and screening values for chlorophyll-a. The proposed human health recreational criteria is for lakes greater than 10 acres, including those in the Big River Floodplain ecoregion where the numeric nutrient criteria does not apply. The proposed criteria provides coverage to lakes where NNC is not applicable and provides an additional layer of protection to lakes with NCC.

Currently, there are four (4) states, territories, or tribes that have adopted EPA's 2019 recommended criteria for cyanotoxins, including South Carolina, North Dakota, American Samoa, and the Miccosukee Tribe. The Department reviewed the EPA's recommendation, supporting documents, and scientific data to determine the appropriateness of adopting the proposed criteria.

2. Comment: **In 2017, a group of 31 agricultural associations submitted to EPA a letter commenting on the proposed criteria during its development. The Department should respond to and discuss these deficiencies in EPA's 304(a) criteria in this RIR.**

2. Response: The Department reviewed comments submitted during the EPA's 2017 public notice of their draft proposed criteria, as well as the EPA's response to public comments published in 2019. After review of both documents, the Department believes that the EPA sufficiently addressed the public comments made on the proposed criteria and there is no need for the Department to duplicate the effort.

3. Comment: **The Department should confirm sampling will not be imposed on permittees and should discuss scenarios where sampling could be imposed. The rule should clarify that it will not apply to independently owned lakes regardless of size and clarify under what circumstances such lakes do not have the whole body contact use designation.**

3. Response: The waterbodies subject to this proposed rule, with the exception to those in the Big River Floodplain ecoregion, are already subject to the lake NNC, chlorophyll-a, and cyanobacteria protections as described in 10 CSR 20-7.031(5)(N). The proposed cyanotoxin criteria are not intended to be the basis for permit limits, as permit implementations will focus on existing criteria for lakes at 10 CSR 20-7.031(5)(N). It is possible that permit conditions could be added to facilities that are found to be discharging microcystins and cylindrospermopsin from their facility into WOTS, but it is unlikely and would be indicative of other issues in the operations and maintenance of the facility or in the quality of its source water. One such scenario would be a permitted lagoon that develops a harmful algal bloom within the lagoon cell and discharges directly to a lake that is greater than or equal to 10 acres, designated for the whole body contact recreational use, and is a WOTS.

This proposed rule will apply to all lakes and reservoirs that are WOTS, designated for whole body contact recreational use, and have an area of 10 acres or greater during normal pool conditions. Independently owned lakes that are not waters of the state per 644.016(27) RSMo., regardless of size, are not subject to the proposed criteria. Recreational criteria apply to all WOTS unless a Use Attainability Analysis is conducted to determine the criteria is not applicable.

4. Comment: **What are the costly issues associated with remediating water bodies that have been negatively impacted by high levels of cyanotoxins and which waterbodies are negatively impacted by high levels of cyanotoxins?**

4. Response: Thank you for your question in regards to Part 3 of the Regulatory Impact Report – A description of the environmental and economic costs and benefits of the proposed rule. The Department has clarified its response to this part, indicating the added cost for determining an impairment or developing a Total Maximum Daily Load (TMDL) as a result of an impairment would be minimal. The associated costs would be response sampling by the Department and subsequent responses through designating impairments and developing TMDLs. At this time, there are no lakes or reservoirs impaired for cyanotoxins that are not already impaired for nutrient criteria. In the event a TMDL is developed for nutrients where an exceedance of the cyanotoxin criteria also occurs, the Department will also address cyanotoxins in the TMDL.

**5. Comment: The Department could become inundated with requests for response-based sampling. With regards to anticipated response sampling activities, the Department should clarify its intent to sample, in response to every complaint or request, lakes on private property.**

5. Response: The Department responds to all reported potential algal blooms. There were 31 harmful algal blooms reported in 2021 and 36 reported in 2022 as of the time of the drafting of this response. Of the 31 reported HABs in 2021, 12 occurred on lakes or reservoirs with private access only. With permission from the property owner, the Department was able access to the lake to sample at 11 of the 12 sites. The Department does not intend to conduct follow-up sampling on private lakes without express permission from the property owner. Based on the most recent two years of data, the Department does not anticipate that the proposed rule will result in a significant increase in sampling requests. Of the 36 HABs reported in 2022, there was 1 reported HAB in a WOTS greater than or equal to 10 acres, in the Big River Floodplain Ecoregion, with whole body contact recreation. This reported HAB was investigated, and was determined to be caused by low dissolved oxygen, not an exceedance of the proposed criteria.

Sampling for microcystins and cylindrospermopsin will be performed on a response-basis for lakes or reservoirs that are WOTS, designated for the whole body contact recreational use, and have an area of at least 10 acres during normal pool conditions. The Department may sample other waterbodies including lakes or reservoirs at the request of private property owners; however, this additional sampling will be at the discretion of the Department.

**6. Comment: The Department did not consider two less intrusive methods: developing an effective form of public reporting of harmful algal blooms and public education, and limiting the criteria to lakes with Whole Body Contact-A.**

6. Response: The Department agrees that public education and outreach on HABs is essential for the effectiveness of the proposed criteria, and is working to provide additional information and resources to the public on what HABs are and how they can respond.

All Waters of the State have presumed uses for recreation in accordance with section 101(a)(2) of the Clean Water Act. As per 10 CSR 20-7.031(1)(F)2.A.(I), Whole Body Contact-A (WBC-A) is a use designation that applies to public swimming areas whereas Whole Body Contact-B (WBC-B) applies to all waters designated for whole body contact recreation that are not contained within WBC-A. While lakes designated for WBC-B do not have public access for recreation, the presumed use for recreation applies indicating whole body recreation may occur.

**7. Comment: The Department should clarify how they will address future cyanotoxin impairments, if a TMDL will ever be implemented for cyanotoxins, and what the TMDL would require beyond a TMDL for lake nutrients. HABs are dependent on a variety of factors, and cyanotoxins are not correlated with HABs or chlorophyll-a. Controlling pollution from both point and non-point sources may not solve HAB formations in waterbodies.**

7. Response: A TMDL establishes the maximum amount of a pollutant allowed in a waterbody and serves as the starting point or planning tool for restoring water quality. Section 303(d) of the Clean Water Act and Title 40 of the Code of Federal Regulations (CFR) Part 30 require states to develop TMDLs for waters that do not meet applicable numeric criteria. As noted in the comment, HABs may occur due to a variety of factors. For this reason, TMDLs to address cyanotoxin impairments will consider the watershed and water quality factors contributing to the specific waterbody impairment. As HABs are a response of nitrogen and phosphorus loading, in addition to other environmental factors such as water temperature and low dissolved oxygen, the Department anticipates TMDL development to primarily target those parameters. Furthermore, the current lake NNC criteria includes cyanotoxins as a “response assessment endpoint,” which means a cyanotoxin impairment (requiring four exceedances over two recreational seasons) is unlikely in a waterbody subject to lake NNC criteria without a corresponding NNC impairment (which only requires one cyanobacteria exceedance in addition to an exceedance of the nutrient screening thresholds).

Although HABs are dependent on a variety of factors, cyanotoxins are a common byproduct. Of the 31 reported HABs in Missouri in 2021, 65% had confirmed cyanotoxins present. Although HABs may occur due to a variety of environmental conditions in addition to excess nutrient loading, the Department believes limiting nutrient pollution from point sources and promoting best management practices from nonpoint sources will reduce or limit the number of HABs in Missouri each year.

**8. Comment: Given the significant variability and imprecision, with regards to inter-laboratory variability studies conducted by the Florida Department of Environmental Protection, additional guidance is needed for both sampling and analysis protocols.**

Response: The Department utilizes two Standard Operating Procedures (SOP) for the collection, handling, and testing of cyanotoxins: MDNR-ESP-360 – Qualitative Screening of Algal Toxins in Drinking and Recreational Waters Using Strip Tests by Abraxis, Inc. and MDNR-ESP-370 – Sample Collection and Handling of Cyanobacteria for Identification, Enumeration, and Cyanotoxin Analysis. These SOPs were developed in accordance with the standards of acceptable methodology and are available on the Department’s website.

**9. Comment: MCE expressed its support for the proposed numeric criteria citing the need for the Department to adapt and respond to environmental changes brought on my changes in climate to better protect human and environmental health while reducing negative economic and environmental costs. Additionally, MCE expressed its support for the inclusion of the Big River Floodplain ecoregion under the proposed rule.**

9. Response: The Department thanks MCE for its comments and interest in Missouri’s Water Quality Standards.

**10. Comment: Response-based sampling will not expand sampling from what is currently being conducted by the Department, preventing lakes from achieving full protection from microcystins and cylindrospermopsin. Response-based sampling is insufficient in identifying exceedances of the proposed criteria when no visible bloom is present, and can result in a failure to protect human and aquatic health. Routine sampling of high usage and high access recreational lakes should be included with this rule.**

**10. Response:** The Department agrees that the occurrence of microcystins and cylindrospermopsin do not always correlate to presence of visible blooms. Preventing HABs and their resulting toxins means limiting nutrients and other inputs that support the growth of toxin-producing algae. Waterbodies subject to this proposed rule, with the exception of those in the Big River Floodplain Ecoregion, are already subject to numeric nutrient criteria. The Department believes that limiting nutrients and other inputs into a waterbody will result in the reduction of toxin-producing algae.

The RIR includes costs related to sampling in addition to what the Department is already conducting. The Department currently cooperates with two programs associated with the University of Missouri Limnology Laboratory. The Statewide Lake Assessment Program and the Lakes of Missouri Volunteer Program both collect samples for nutrients and algal toxins within the recreational season on a routine basis, not in response to a HAB. To date, few exceedances of the proposed criteria have been identified based on this routine sampling. As such, the Department does not believe an increase in the frequency of routine sampling is necessary at this time. The Department may choose to increase the frequency of this routine sampling for cyanotoxins at a later date in the event of increased HAB events and/or increasing occurrences of cyanotoxin exceedances.

Additional response sampling may occur at lakes that are WOTS, greater than or equal to 10 acres, and designated for whole body recreational use. The Department encourages public education and outreach on HAB related issues and is working to provide additional information and resources to the public on what HABs are and how they can respond. The Department encourages managers of lakes with high recreation to be vigilant and report suspected HABs, sample for toxins when warranted, and provide information and education on HABs to allow for the greatest effectiveness of the proposed criteria.

**11. Comment: The Department should expand the proposed criteria to lakes and reservoirs that are Waters of the State, designated for whole body contact, of any size upon the revision and verification of the Missouri Use Designation Database (MUDD).**

**11. Response:** The Department will revisit this request for lakes and reservoirs of all sizes that are WOTS and designated for whole body contact recreation during a future rule review after the MUDD has been revised and verified.

**12. Comments: The Department should create and implement long-term data collection and public facing tracking for HAB occurrences and trends.**

12. Response: The Department is currently working on a map viewer to better track HAB occurrences and to more effectively inform the public of the current and previous locations of HABs.

**END COMMENTS AND RESPONSES**